

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Claim 1 (Canceled).

Claim 2 (Currently Amended): A parameter determination method of a template matching searching from a second image a matching area having the highest correlation with a template including a reference point in a first image, method comprising:

calculating, based on the first image, a difference between a corresponding point in the second image corresponding to the reference point and a calculated point in the second image which is obtained by the template matching; and

determining, based on the difference, at least one of parameters of the template matching, the parameters comprising a location of the reference point, a size of the template and resolutions of the first and second images; The method according to claim 1,

wherein the difference comprises an upper bound of average distance between the corresponding point and the calculated point.

Claims 3-7 (Canceled).

Claim 8 (Currently Amended): An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein, the computer readable program searching from a second image a matching area having the highest correlation with a template including a reference point in a first, the computer readable program code means comprising:

computer readable program code means for causing a computer to calculate, based on the first image, a difference between a corresponding point in the second image corresponding to the reference point a calculated point in the second image which is obtained by template matching; and

computer readable program code means for causing a computer to determine, based on the difference, at least one of parameters of the template matching, the parameters comprising a location of the reference point, a size of the template and resolutions of the first and second images; ~~An article of manufacture according to claim 7,~~

wherein the difference comprises an upper bound of average distance between the corresponding point and the calculated point.

Claims 9-13 (Canceled).

Claim 14 (Currently Amended): An image processing device for searching from a second image a matching area having the highest correlation with a template including a reference point in a first image, comprising:

a calculation unit configured, based on the first image, to calculate a difference between a corresponding point in the second image corresponding to the reference point and a calculated point which is obtained by template matching; and

a determination unit configured to determine, based on the difference, at least one of parameters of the template matching, the parameters comprising a location of the reference point, a size of the template and resolutions of the first and second images; ~~The device according to claim 13,~~

wherein the difference comprises an upper bound of average distance between the corresponding point and the calculated point.

Claims 15-18 (Canceled).

19. (Previously Presented): The method according to claim 2, wherein the calculating calculates the following upper bound u:

$$u = \sum_{e \in S} |e| P(e)$$

where, s is a searching range, e is an error vector, and P(e) is a probability that an error indicated by the error vector e is generated as a result of the template matching and is expressed as follows:

$$P(e) \leq \exp \left\{ -\frac{1}{2} N E_{TM}(e) \right\}$$

where

$$E_{TM}(e) = \max_{0 < \rho < 1} E_{TM}(e, \rho),$$

$$E_{TM}(e, \rho) = R \left\{ \gamma_1^2 \frac{\rho}{1 + \rho} + \log(1 - \rho^2) \right\} + (1 - R) \gamma_2^2 \rho(1 - \rho),$$

$$\gamma_1^2 = \frac{1}{|W_1|} \sum_{p \in W_1} \frac{\Delta^2(p, e)}{\sigma^2}, \quad \gamma_2^2 = \frac{1}{|W_2|} \sum_{p \in W_2} \frac{\Delta^2(p, e)}{\sigma^2}$$

where $W_1 = W(O) \cap W(e)$, $W_2 = W^c(O) \cap W(e)$, and $W_3 = W(O) \cap W^c(e)$,

W^c represents complement of W,

$W(O)$ is a template having the corresponding point as the center, and

$W(e)$ is an area displaced by the error vector e .

20. (Previously Presented): The method according to claim 7, wherein the calculating calculates the following upper bound u :

$$u = \sum_{e \in S} |e| P(e)$$

where, s is a searching range, e is an error vector, and $P(e)$ is a probability that an error indicated by the error vector e is generated as a result of the template matching and is expressed as follows:

$$P(e) \leq \exp \left\{ -\frac{1}{2} N E_{TM}(e) \right\}$$

where

$$E_{TM}(e) = \max_{0 < \rho < 1} E_{TM}(e, \rho),$$

$$E_{TM}(e, \rho) = R \left\{ \gamma_1^2 \frac{\rho}{1 + \rho} + \log(1 - \rho^2) \right\} + (1 - R) \gamma_1^2 \rho(1 - \rho),$$

$$\gamma_1^2 = \frac{1}{|W_1|} \sum_{p \in W_1} \frac{\Delta^2(p, e)}{\sigma^2}, \quad \gamma_2^2 = \frac{1}{|W_2|} \sum_{p \in W_2} \frac{\Delta^2(p, e)}{\sigma^2}$$

where $W_1 = W(O) \cap W(e)$, $W_2 = W^c(O) \cap W(e)$, and $W_3 = W(O) \cap W^c(e)$,

W^c represents complement of W ,

$W(O)$ is a template having the corresponding point as the center, and

$W(e)$ is an area displaced by the error vector e .

21. (Previously Presented): The method according to claim 13, wherein the calculating calculates the following upper bound u:

$$u = \sum_{e \in S} |e| P(e)$$

where, s is a searching range, e is an error vector, and P(e) is a probability that an error indicated by the error vector e is generated as a result of the template matching and is expressed as follows:

$$P(e) \leq \exp \left\{ -\frac{1}{2} N E_{TM}(e) \right\}$$

where

$$E_{TM}(e) = \max_{0 < \rho < 1} E_{TM}(e, \rho),$$

$$E_{TM}(e, \rho) = R \left\{ \gamma_1^2 \frac{\rho}{1 + \rho} + \log(1 - \rho^2) \right\} + (1 - R) \gamma_2^2 \rho(1 - \rho),$$

$$\gamma_1^2 = \frac{1}{|W_1|} \sum_{p \in W_1} \frac{\Delta^2(p, e)}{\sigma^2}, \quad \gamma_2^2 = \frac{1}{|W_2|} \sum_{p \in W_2} \frac{\Delta^2(p, e)}{\sigma^2}$$

where $W_1 = W(O) \cap W(e)$, $W_2 = W^c(O) \cap W(e)$, and $W_3 = W(O) \cap W^c(e)$,

W^c represents complement of W,

$W(O)$ is a template having the corresponding point as the center, and

$W(e)$ is an area displaced by the error vector e.